REMARKS

Claims 1, 3-4, 9-10 and 15-18 are pending. This Amendment cancels claims 2, 5-8, 11-14 and 19-20 (claims 5-8, and 11-14 were withdrawn from consideration in an earlier amendment). Reexamination and reconsideration of the subject application, as amended, are respectfully requested.

The October 26, 2001 Office Action objected to claims 11 and 16 under 37 CFR 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. In response, Applicants note that claim 11, which was previously withdrawn from consideration, is cancelled above. Additionally, claims 15 and 16 are amended to specify a non-transparent metal layer that contacts an ohmic contact layer.

The October 26, 2001 Office Action also objected to claim 9 being a substantial duplicate of claim 2. In response, claim 2 is cancelled.

The October 26, 2001 Office Action also rejected claims 15-20 under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such as way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In particular, the Office Action asserted that it was not clear where in the originally filed specification support can be found for "an opaque metal layer" as claimed in claims 15 and 18.

With all respect to the Examiner, the originally filed specification (see, lines 1-7 of page 8) supports a "non-transparent metal layer," specifically tungsten, molybdenum, or chrome. All of those materials are metals, all are "opaque," and "opaque" is a subset of "non-transparent."

Because "non-transparent" is broader than "opaque," claims 15 and 18 are amended to broaden the scope of coverage by specifying "non-transparent" metal layers.

The October 26, 2001 Office Action rejected claims 1-4 and 9-10 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the USPTO found it unclear how the source electrode is being defined with respect to the active area. One relationship is "source and drain electrodes made from a transparent conductive material that is in contact with the active layer." Another relationship is "an ohmic contact layer disposed between the active layer and the source electrode."

In response, claim 1 is amended to clarify the relationship between an active layer, an ohmic contact layer, and source and drain electrodes. As claims 3-4 and 9-10 depend from claim 1, and as claim 2 is cancelled, the 35 U.S.C. 112, second paragraph rejections of claims 1-4 and 9-10 are fully addressed.

The October 26, 2001 Office Action also rejected claims 13-14 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In response, Applicants note that claims 13-14, which were previously withdrawn from consideration, are cancelled above.

The October 26, 2001 Office Action rejected claims 18-20 under 35 U.S.C. §102(b) as being anticipated by Kawai et al. (USPAT 5,821,133). In response, claim 18 is amended such that a non-transparent metal layer extends over an end of a transparent conducting layer to electrically contact a contact layer. Such is not disclosed in, or obvious from, Kawai et al. (USPAT 5,821,133). In view of the amendments to claim 18, claims 19-20 are cancelled.

The October 26, 2001 Office Action also rejected claims 1, 2, 4, 9, and 15-17 under 35 U.S.C. §103(a) as being unpatentable over the applicant's admitted prior art in view of Kawai. (USPAT 5,821,133). The Patent Office indicated that applicant's admitted prior art discloses a sensor TFT generating optical current by incident light reflected from an object. Also, the patent Office indicates that applicant's admitted prior art discloses a storage capacitor storing charges generated by a sensor TFT. Also, that a switching TFT controls the release of the stored charges to an external circuit for display. That switching TFT includes a gate electrode (15), an insulating layer (17), an active layer (21), and source and drain electrodes that are comprised of a transparent conducting material in contact with the active layer, and an ohmic contact layer.

However, the patent office acknowledges that applicant's admitted prior art does not disclose dual-layered source and drain electrodes comprised of a transparent material and of a metal material. But, the USPTO states that Kawai teaches source and drain electrodes that are comprised of a transparent conductive material in contact with an active layer and second electrodes comprised of metal material. The Patent Office then asserts that it would have been obvious to one of ordinary skill in the art at the time of the present invention to use a dual-layered structure source and drain electrodes of Kawai in the switching TFT of the applicant's admitted prior art in order to transmit signals applied to each pixel electrode, and to turn on and off the signals separately for each pixel.

With all respect to the Examiner, the 35 U.S.C. §103(a) rejections of claims 1, 4, 9, and 15-17 as being unpatentable over the applicant's admitted prior art in view of Kawai are traversed. That traversal is based on the conclusion of obviousness being incorrect because, in

fact, there is no motivation to combine the admitted prior art with the dual-layered structure found in Kawai.

The USPTO asserts that it is obvious to implement prior art optical sensors with dual-layer source and drain electrodes to transmit signals applied to each pixel electrode, and to turn ON and OFF signals separately for each pixel. But, as provided in the Background of the Invention, both transparent and non-transparent electrodes can adequately do that, reference, for example, Figure 3 and its supporting text. Therefore, optical detecting sensors having dual-layer source and drain electrodes provide no apparent benefit regarding transmitting signals.

However, optical detecting sensors with dual-layered structures *are* beneficial in improving TFT switching characteristics, reference Figure 6 and its supporting text. Such improved switching characteristics are not described in Kawai. Furthermore, there is no indication that improved TFT switching characteristics produced by dual-layered structures occur in Kawai. The dual-layered "electrode" of Kawai results not from a dual-layered electrode, but from an overlap of a transparent pixel electrode that enables light transmission with a metallic signal electrode. Therefore, those skilled in the art of optical detecting sensors would not be motivated to implement dual-layered electrodes.

Therefore, as provided in claim 1, an optical detecting sensor having a switching TFT with a gate electrode, an insulating layer on the gate electrode, an active layer on the insulating layer, an ohmic contact layer on the active layer, and dual layered source and drain electrodes that are comprised of first source and drain electrodes made from a transparent conductive material that is in contact with the ohmic contact layer and second source and drain electrodes comprised

of a metal material on the first source and drain electrodes is not obvious. The Examiner's attention is directed to the lack of a pixel electrode in the claimed optical detecting sensor.

In view of the allowability of claim 1, claims 4 and 9, which depend from claim 1, are also allowable. Additionally, claims 3 and 10 (which stand rejected under 35 U.S.C. 103(a) as being unpatentable over the applicants admitted prior and Kawai, and further in view of de Boer et al. (USPAT 5,656,824)) also depend from claim 1 and are also deemed allowable.

Furthermore, as provided in claim 15, a thin film transistor (TFT) sensor with a sensor TFT (having a gate electrode and spaced apart first and second sensor electrodes) and a switching TFT with a second switching electrode having a dual layer structure comprised of a transparent conducting layer in contact with an active layer and a non-transparent metal layer over the transparent conductive layer is not obvious. The Examiner's attention is directed to the lack of a sensor TFT in Kawai. Additionally, claims 16-17, which depend from claim 15, are also believed to be allowable.

In view of the foregoing, claims 1, 3-4, 9-10, and 15-18 are believed to be allowable. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at (202) 624-1285 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

Regarding the Finality of the 10/26/01 Office Action

Applicants respectfully request the US Patent and Trademark Office to withdraw the finality of the 10/26/01 Office Action. The rejections of all of the claims under consideration are

at least partially based on newly discovered prior art (USPAT 5,821,133). As the Applicants have not previously been given the opportunity to distinguish their invention over that newly discovered prior art it is unfair to make the 10/26/01 Office Action final.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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Attachment: Marked-up Version Showing Amended Claim Changes

ATTACHMENT

MARKED-UP VERSION SHOWING AMENDED CLAIM CHANGES

1. (Twice Amended) An optical detecting sensor, comprising:

a sensor thin film transistor (TFT) generating optical current by incident light reflected from an object;

a storage capacitor storing charges of the optical current generated in the sensor thin film transistor;

a switching TFT controlling a release of the stored charges of the storage capacitor to an external circuit for display of an image of the object, the switching TFT having a gate electrode, an insulating layer on the gate electrode, an active layer on the insulating layer, an ohmic contact layer on the active layer, and dual layered source and drain electrodes that are comprised of first source and drain electrodes made from a transparent conductive material that is in contact with the [active] ohmic contact layer, and from [and] second source and drain electrodes comprised of a metal material on the first source and drain electrodes.[; and

an ohmic contact layer disposed between said active layer and said source electrode.]

3. (Amended) An optical detecting sensor according to claim 1, wherein the metal material [for the dual-layered drain and source electrodes] is selected from a group consisting of tungsten, chrome and molydemum.

15. (Amended) A thin film transistor (TFT) sensor, comprising:

a sensor TFT having a gate electrode and spaced apart first and second sensor electrodes; and

a switching TFT comprised of:

a gate electrode on a transparent substrate;

an insulating layer over the gate electrode;

a semiconductor layer on the insulating layer and adjacent the gate electrode, wherein the semiconductor layer includes an active layer and a contact layer;

spaced apart first and second switching electrodes on the semiconductor layer that define a channel region, wherein the second switching electrode electrically contacts the [contact layer] semiconductor layer; and

a storage capacitor having a first storage electrode and a second storage electrode, wherein the second storage electrode of the storage capacitor connects to the first sensor electrode and to the second switching electrode;

wherein the second switching electrode is a dual layer structure comprised of a transparent conducting layer that is in contact with said [active] semiconductor layer and [an opaque] a non-transparent metal layer over said transparent conductive layer.

16. (Amended) A thin film transistor (TFT) sensor according to claim 15, wherein the [transparent conducting] non-transparent metal layer also contacts the [active] semiconductor layer.

18. (Amended) A thin film transistor (TFT), comprising:

a gate electrode on a substrate;

an insulating layer over the gate electrode;

a semiconductor layer on the insulating layer and adjacent the gate electrode, wherein the semiconductor layer includes an active layer and a contact layer; and

spaced apart first and second electrodes that electrically contact the contact layer so as to define a channel region;

wherein the second electrode of the TFT is a dual layer structure comprised of a transparent conducting layer that electrically contacts the contact layer and of [an opaque] a non-transparent metal layer that is disposed over the transparent conducting layer, wherein the non-transparent metal layer extends over an end of the transparent conducting layer to electrically contact the contact layer.